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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,794	10/23/2003	Ke Liu	C-2990HyS	7156

7590

03/18/2005

M. P. Williams  
210 Main Street  
Manchester, CT 06040

EXAMINER
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NGUYEN, TU MINH

ART UNIT	PAPER NUMBER
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3748

DATE MAILED: 03/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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<b>Office Action Summary</b>	Application No.	Applicant(s)	
	10/691,794	LIU ET AL.	
	Examiner	Art Unit	
	Tu M. Nguyen	3748	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2005.
- 2a) ☒ This action is FINAL.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### DETAILED ACTION

1. This Office Action is in response to a telephone interview with Mr. M. P. Williams, an Applicant's Attorney, conducted on March 16, 2005. Overall, claims 1-4 are pending in this application.

Applicant argues that Kirwan et al. fail to disclose a step of "repetitively, during operation of the engine, periodically applying the syngas to the auxiliary system in the adequate amount during first periods of time interspersed with second periods of time." This argument is persuasive; therefore, the previous office action is hereby withdrawn and a new office action is set forth below.

#### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office Action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor, III et al. (U.S. Patent Application 2004/0020447).

Re claim 1, as shown in Figures 6-8, Taylor, III et al., in an internal combustion engine system (14) which operates on fuel and which has an auxiliary system (124) which intermittently

uses an internally generated mixture including hydrogen and carbon monoxide (see paragraph 0019) ("syngas", hereinafter), disclose a method comprising:

- generating in a reformer (12) at least an amount of syngas adequate for the auxiliary system (124);
- repetitively, during operation of the engine, periodically applying the syngas to the auxiliary system (124) in the adequate amount during first periods of time (regeneration of auxiliary system) (see paragraph 0030) interspersed with second periods of time (non-regeneration of auxiliary system) (from claims 1-3, the syngas is supplied to the engine system and the auxiliary system); and
- during the second periods of time (non-regeneration of auxiliary system), generating the syngas to direct a second amount of syngas to the engine system (paragraph 0023).

Taylor, III et al., however, fail to disclose that during the second periods of time, the second amount of syngas generated is no more than a small fraction of the adequate amount of syngas generated during the first periods of time.

During the first periods of time (regeneration of auxiliary system), the syngas is generated in an adequate amount for the auxiliary system (124) and for the engine system (14) (paragraphs 0023 and 0030). On the other hand, during the second periods of time (non-regeneration of auxiliary system), the syngas is produced in a second amount to supply to the engine system only. Thus, it is obvious to one with ordinary skill in the art that in Taylor, III et al., the second amount of syngas generated during the second periods of time is no more than a small fraction of the adequate amount of syngas generated during the first periods of time.

Art Unit: 3748

Re claims 2 and 3, as shown in Figures 6-8, Taylor, III et al. disclose a method and an apparatus for generating a mixture including hydrogen and carbon monoxide (see paragraph 0019) ("syngas", hereinafter), the apparatus comprising:

- an oxides-of-nitrogen ("NOx" hereinafter) trap assembly (124) having an adsorption material which is periodically regenerated with syngas;
- an internal combustion engine system (14) which operates on fuel and provides exhaust having NOx therein to the NOx trap assembly;
- first means (12) for generating syngas from the exhaust and the fuel in an amount effective to regenerate the adsorption material in the NOx trap assembly;
- second means (12) for periodically applying at least the effective amount of the syngas to the NOx trap assembly for first periods of time (regeneration of NOx trap) interspersed with second periods of time (non-regeneration of NOx trap) (from claims 1-3, the syngas is supplied to the engine system and the auxiliary system); and
- third means (a controller not shown but obviously must have) for altering the operation of either the first means or the second means during the second periods by diverting the syngas from the NOx trap assembly to an inlet of the engine (paragraph 0023).

Taylor, III et al., however, fail to disclose that the first periods of time are on the order of 5-10 seconds long and the second periods of time are about 8-20 times longer than the first periods of time; and that during the second periods of time, an amount of fuel and exhaust gas used to regenerate the syngas is reduced so as to generate no more than a small fraction of the effective amount of syngas.

Taylor, III et al. disclose the claimed invention except for specifying optimum ranges of regeneration time of NOx trap on the order of 5-10 seconds long and non-regeneration time of NOx trap of about 8-20 times longer than a regeneration time of NOx trap. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide specific optimum ranges of regeneration time and non-regeneration time of NOx trap, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

During the first periods of time (regeneration of auxiliary system), the syngas is generated in an effective amount for the NOx trap (124) and for the engine system (14) (paragraphs 0023 and 0030). On the other hand, during the second periods of time (non-regeneration of auxiliary system), the syngas is produced in a second amount to supply to the engine system only. Thus, it is obvious to one with ordinary skill in the art that in Taylor, III et al., an amount of fuel and exhaust gas used to regenerate the syngas is reduced during the second periods of time so that the second amount of syngas generated is no more than a small fraction of the effective amount of syngas produced during the first periods of time.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Taylor, III et al. as applied to claim 3 above, in view of May et al. (U.S. Patent 6,820,417).

The apparatus of Taylor, III et al. discloses the invention as cited above, however, fails to disclose that the adsorption material in the NOx trap assembly comprises barium carbonate.

As shown in Figure 1 and indicated on lines 41-52 of column 4, May et al. teach that it is conventional in the art to use barium carbonate as a NO<sub>x</sub> absorbent material for the NO<sub>x</sub> absorbent element (18b) to absorb NO<sub>x</sub> in the exhaust gas at higher temperature range. It would have been obvious to one having ordinary skill in the art at the time of the invention was made, to have utilized barium carbonate taught by May et al. as in the NO<sub>x</sub> trap of Taylor, III et al., since the use thereof would have produced a NO<sub>x</sub> trap effective to purify NO<sub>x</sub> at higher temperature range.

### ***Response to Arguments***

5. Applicant's arguments with respect to the references applied in the previous Office Action have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office Action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37

Art Unit: 3748

CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

***Prior Art***

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure and consists of four patents: Smaling (U.S. Patent 6,758,035), Kaupert et al. (U.S. Patent 6,810,658), Kupe et al. (U.S. Patent 6,832,473), and Klenk et al. (U.S. Patent 6,845,608) further disclose a state of the art.

***Communication***

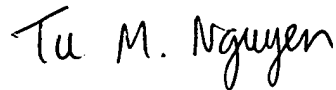
8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Tu Nguyen whose telephone number is (571) 272-4862.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mr. Thomas E. Denion, can be reached on (571) 272-4859. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.



Art Unit: 3748

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



TMN

Tu M. Nguyen

March 16, 2005

Patent Examiner

Art Unit 3748